

GCOS

TECHNICAL SUPPORT PROJECT PACIFIC



Penrhyn Radar and Radar Building - 91810

QUARTERLY REPORT

JULY - SEPTEMBER 2004

**METEOROLOGICAL SERVICE OF
NEW ZEALAND LIMITED**

3 November 2004

Revised

1 Executive Summary

This is the first Quarterly report of the GCOS Technical Support Project – Pacific (TSP).

The three GUAN stations (Tarawa, Funafuti and Penrhyn) that are supported by the TSP have performed quite well during the quarter. Communications continues to be the most significant issue at all stations resulting in a limited amount of lost data. The problem is much more pronounced for operational, as opposed to climatological, applications where the data is required to meet global deadlines of “observation time plus three hours”. We are presently working on a satellite / HF radio digital email solution to resolve this problem.

Some GUAN station fault assistance was provided at Tarawa where a faulty component from a newly installed Proton hydrogen generator was replaced. Travel disbursements were allocated to another project that an engineer was traveling to Tarawa to undertake.

We purchased a Proton Energies Depot repair kit to support the Proton hydrogen generators that have been installed at Tarawa and Penrhyn, and will soon be installed at Funafuti. We are in discussions with Vaisala for a Digicora regional spares kit that will be purchased in Q2.

The three GSN inspector’s kits are nearly finished and photos of one of the kits are appended to this report. The kits were designed and constructed by our calibration engineers. This portable kit will enable countries to undertake their own inspections of their GSN stations and then return the kit to MetService for the inspection instruments to be calibrated back into the laboratory, for a kit check and refurbishment prior to the kit being reissued to another country.

Training to the countries supported by the TSP will be provided at Melbourne as an extension to a WMO Climate Data Management workshop in Q2. This collaborative interaction with WMO and the Bureau of Meteorology has benefited all parties and allowed us to proceed with the TSP training component.

2 GUAN Station Performance

2.1 Overview

At present, three stations are supported under the TSP – Tarawa, Funafuti and Penrhyn. Routine operational expenditure for these stations is primarily provided by the Met Office, with some funding from WMO VCP for Penrhyn. MetService provides some technical and administration support. The TSP enables the technical

assistance already allowed for to be enhanced. As Rarotonga may be of interest for future GUAN applications we have included monitoring for this station but excluded any other reporting.

2.2 Tarawa Upper Air Programme

Communications problems resulted in five upper air messages being unable to be sent during the quarter. The growing proliferation of local IPS subscribers coupled with a lack of capacity results in email messages being queued for increasingly lengthy periods of time and, we suspect, sometimes deleted. In addition, in September, the Kiribati Meteorological Service was disconnected by the local telecommunications provider. We understand there was an issue with the account.

A MetService engineer coincidentally arrived shortly after this outage commenced to repair the Proton and after some experimentation we were able to patch together a satellite digital email communications link using our satellite telephone. We managed to provide some assistance to restore the local service but with a slow response from the supplier, over three weeks elapsed before the service was restored. Although most of the messages were recovered some were irretrievable. The effect was much more pronounced on operational performance, but much less on the climatological which does not require a tight delivery deadline.

A few weeks after the Proton was installed a fault developed in the gas separator unit. The part was replaced from the GCOS Technical Support Project (TSP) regional spares kit and Proton Energies subsequently replenished the kit under warranty.

2.3 Funafuti Upper Air Programme

This programme operated very effectively during the quarter. While considerable communication problems are being experienced recovering the upper air data to meet operational deadlines there have been no problems ultimately recovering the data for climatology.

The HF digital email system, that the Met Office funded, operated extremely well until the receiving station in New Zealand switched in September to a satellite system with the HF as back-up when the satellite was unavailable. At that stage all communications were lost. The receiving station offers the HF service free of charge to us and they generously re-instated the former “HF only” system for a brief period in October to enable us to receive all the queued upper air messages.

2.4 Penrhyn Upper Air Programme

This programme has continued to operate well with excellent heights achieved. We view it as a model in the region. Some communications problems were experienced, again with the local ISP, but much less significant than the other two stations. Ongoing delays to scheduled voyages by the ship from Rarotonga resulted in the supply of radar targets becoming depleted. Although some were air-freighted, until the airline stopped operating as aviation fuel at Penrhyn had also run out, we lost three days of flights.

The programme was suspended in September, as the charts indicate, while the engineer took annual leave. He visited us while in New Zealand. During his duty day he visited the engineering base and received some instruction in the Proton and configuring the Digicora for PTU radiosondes.

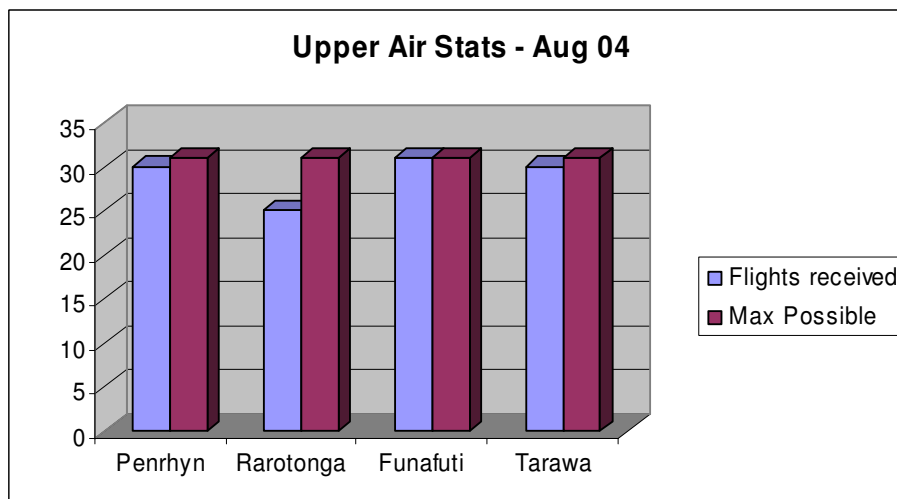
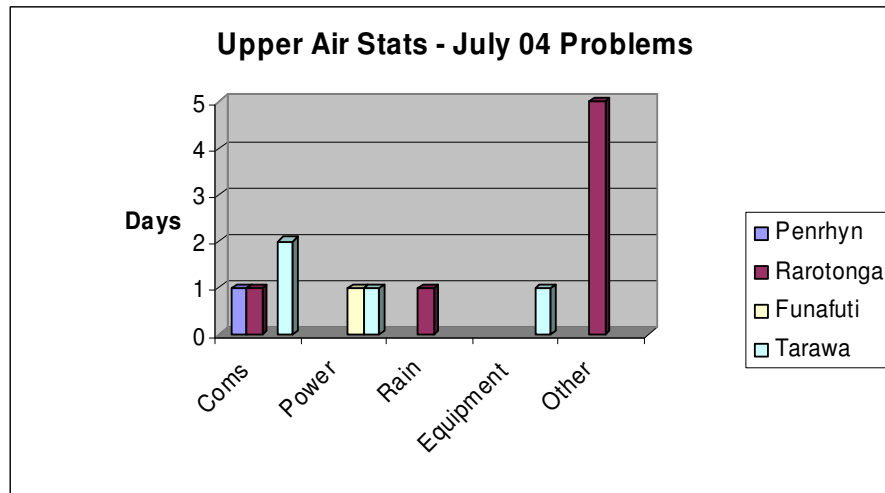
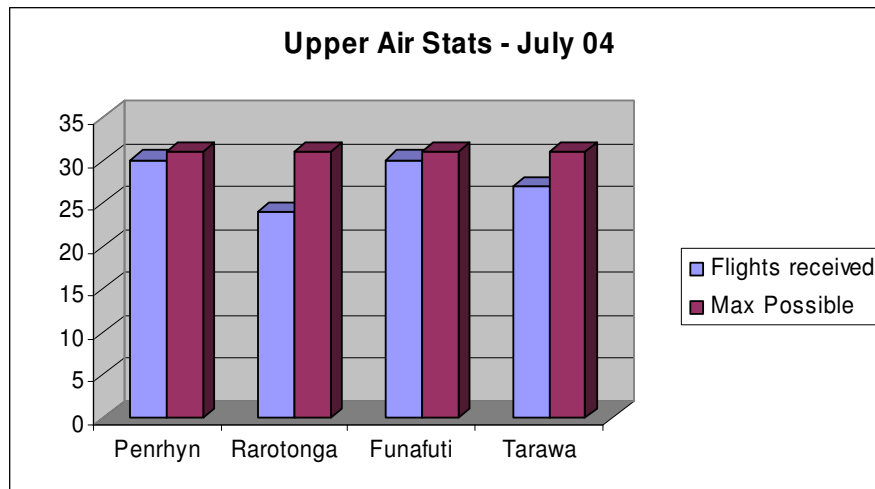
The Proton performs faultlessly. One radar flight was terminated due to a radar fault – a thyatron failed. Of the three we donated second hand from MetService stocks in the last quarter one spare now remains. We are using GCOS TSP programme funds to purchase a further two spares. It is important that the radar be kept serviceable for as long as possible as this will permit the cheaper RS80-15H radiosondes to be used.

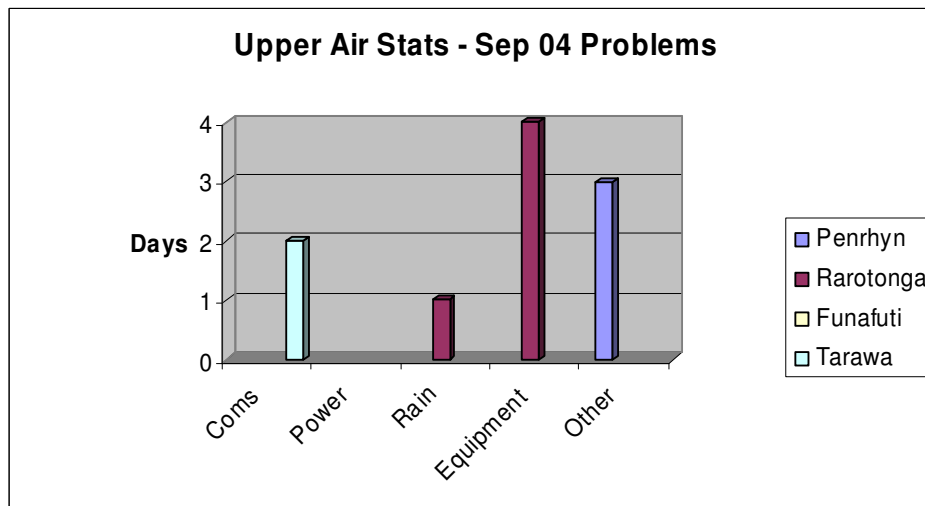
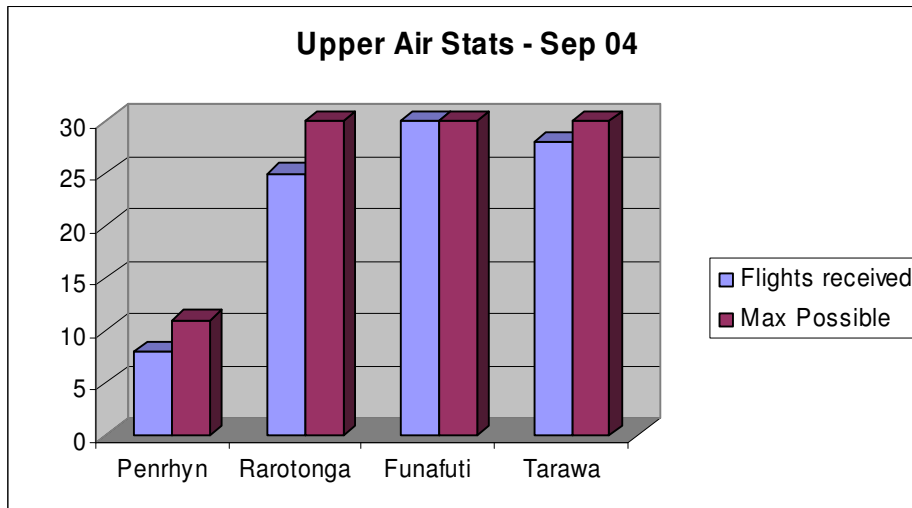
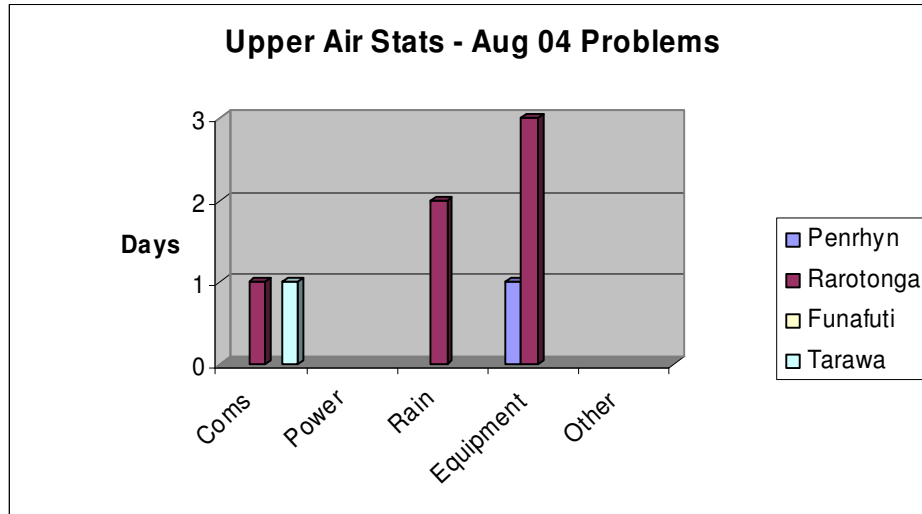
The programme will be expanded to radiosonde on 1 November – probably initially using 350 gram balloons but switching to 700 gram balloons when they can be delivered. The stocks are presently in New Zealand awaiting shipping to Rarotonga where they will be trans-shipped to Penrhyn. This will reduce the hydrogen storage capacity to about four days from the present seven. More tanks would restore this but as the programme operates so well we are not recommending any increase for now.

2.5 Upper Air Statistics

The charts are largely self-explanatory. While for operational purposes it is important that the upper air data is received by the global models by H+3 (three hours after the observation time); for climatological needs it is only important that the data is received. We are encountering considerable communication problems achieving the operational deadlines but for climate requirements the results are much better as is indicated by the performance charts.

The “Problems” chart provides a breakdown of areas in which problems occurred at the stations. The "Other" category encompasses occasions when no information has been provided from the station and we have been unsuccessful in discovering the reason. It is also used for depleted stores. The “Rain” category applies to radar wind finding and signal loss due to strong rain echoes.



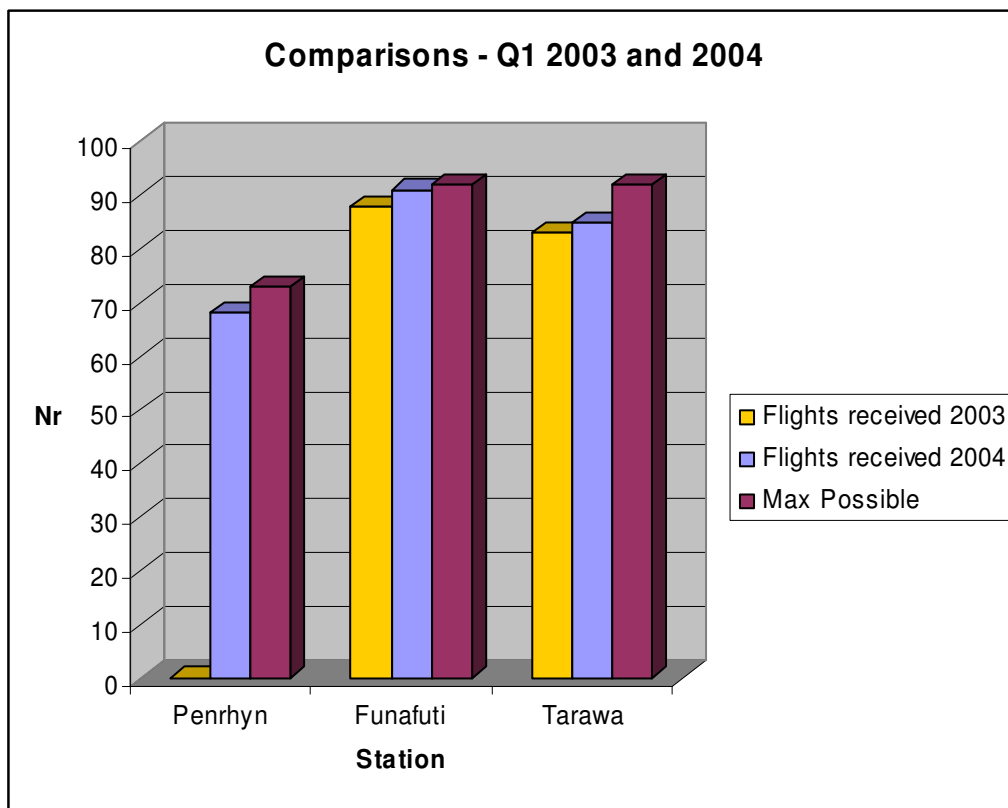


2.6 Climate Temp Messages

We re-established Climate Temp messages at Tarawa and Funafuti in July. These messages had been discontinued, we think, about 1991. *We believe this is a significant outcome as a result of the TSP as it will ensure the climate data from these stations files in global climate databases.*

Penrhyn will commence when the programme expands to radiosonde (1 November).

2.7 Comparison of 2003 and 2004 Quarterly Results



3 GSN Station Performance

3.1 Overview

Synoptic reports from GSN stations provide the input to enable the end of month Climate Message to be constructed for each station. Our focus to date has been on the GUAN programme – consistent with the GCOS priorities as we understand them. However, work to complete the GSN inspection kits has been undertaken. We

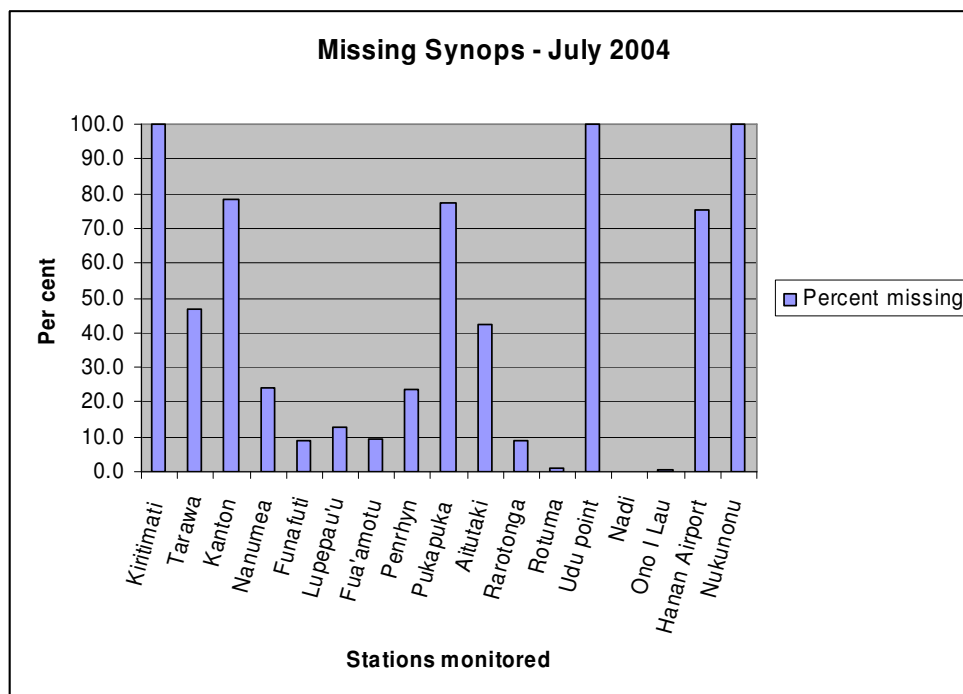
understand that at present Fiji is fully complying with Climate Message requirements and that the Cook Islands and Tuvalu are providing a plain language climate report.

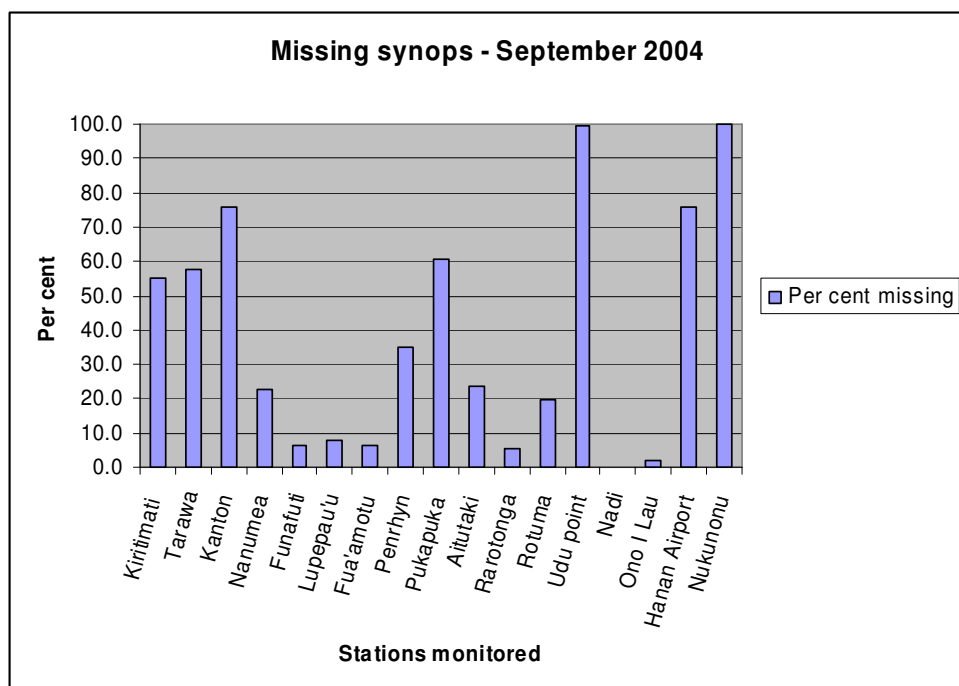
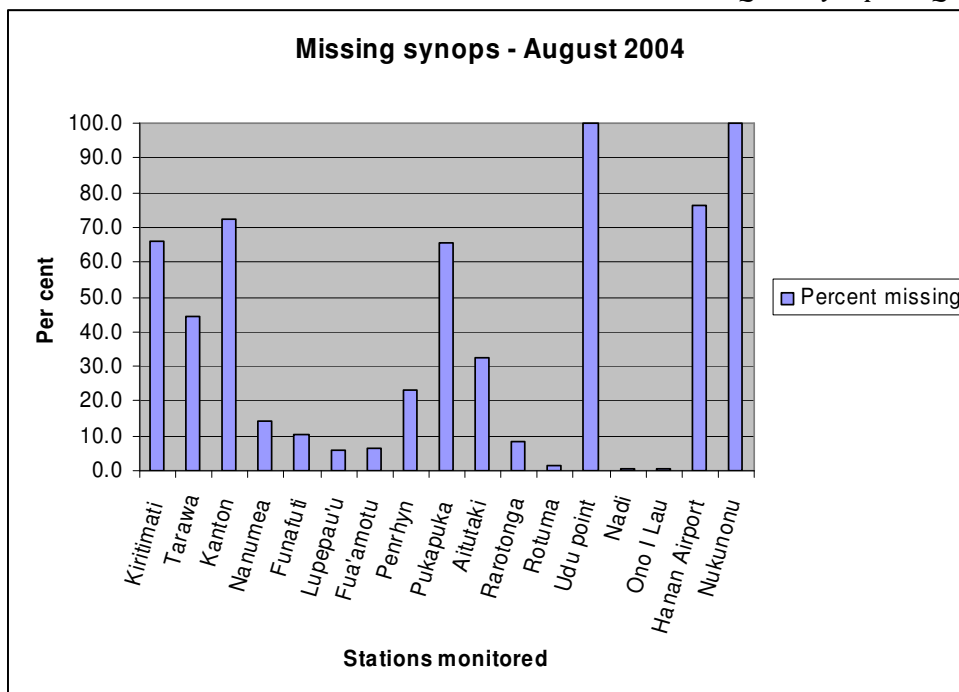
The planned Climate Data Management workshop at Melbourne in November and December will present software options to Pacific countries for completing the Climate Message. We are planning to offer advice and assistance following that workshop to re-establish the required Climate Messages. A fundamental problem for most countries will continue to be the non-receipt of the required synoptic reports at the respective Meteorological Services' Head Offices where the Climate Messages would be compiled.

3.2 GSN Station – Missing Synoptic Reports

The chart shows the number of missing synoptic reports from the region's GSN stations that are passed through MetService's gateway. It does not take account of:

- Papua New Guinea, Solomon Islands and Vanuatu reports that under the GTS communications arrangements do not flow through MetService.
- Reports that may have been received by the Meteorological Services' Head Offices but not on-forwarded to MetService.





- **Hanan Airport** AWS was restored by a MetService engineer on 1 October and the next Quarter's report should show a significant improvement.
- Similarly, a new AWS was installed at **Nukunonu** by a MetService engineer during October which will restore this station's record.

4 Project activity

4.1 GUAN Routine Maintenance

We have recently had an engineer at Tarawa installing the new Proton hydrogen plant and a visit to Funafuti is planned shortly for similar work. We are planning to undertake these visits after January 2005 when some time will have elapsed since an engineer last visited.

4.2 GUAN Fault Maintenance

A fault occurred on the Tarawa Proton soon after the installation engineer left. Some time was spent evaluating the fault with the local staff but the restoration required a visit by an engineer. The faulty gas separator component was replaced under warranty by Proton Energies and we drew on the spare unit held in the TSP Regional Spares kit. The fault timing coincided with an engineering visit to Tarawa to evaluate a refurbishment project and no disbursements needed to be costed to the TSP. As the old M28 hydrogen plant was still operating in case of any “teething” problems with the Proton, the upper air programme continued without disruption.

Funafuti lost all email communication through its local ISP a few months ago and no upper air messages were received. The formal back-up is HF Digital email communications and this operated for a while but then stopped. We evaluated the original problem and interacted with the HF Radio station in New Zealand that we use for HF Digital email. This station offers its service to us at no charge but recently switched to satellite email with HF Digital as an automatic switched backup if a satellite was unavailable. This accounted for the inability for Tuvalu to make contact using HF as the primary protocol. As reported earlier, the radio station reverted back to the old protocol for a number of hours which enabled Tuvalu to send all of its queued HF traffic to us.

Assistance was provided to Penrhyn to resolve a computer power supply problem and to source spare radar thyratrons.

4.3 GUAN Ground Equipment consumables

No activity this Quarter.

4.4 GUAN Technical Spares

A Proton Energies Hydrogen Generator Depot spares kit was purchased as part TSP Regional Spares kit. It has already proven useful in that the spare gas separator component was able to be used from the kit and installed at Tarawa, thereby enabling the fault to be rectified on a visit for another project. This saved using one of the Fault Maintenance trips. Proton Energies has already replaced the used gas separator unit at no charge.

A Vaisala Digicora spares kit has been costed. We have been careful to only include components in the kit that will not be made redundant should a switch to the RS-92 radiosonde be made in the future. The Met Office has kindly provided a top-up to the budget for this kit to enable all desirable spares to be held. Additionally, Vaisala kindly offered to substantially discount one item to enable us to stay within budget. Ordering is imminent.

The purchase of two thyratrons for Penrhyn radar spares is in progress. These items usually fail without warning and it is advisable to hold some spares on station. See earlier section.

4.5 GUAN Country reimbursement

Only minor costs are accommodated and for the presently assisted stations all reasonable in-country operating costs are provisioned.

4.6 GSN Establishment of Inspector's kits

One inspector's kit has been completed and we are awaiting a couple of minor items for the other two. The Manual of Instructions is being finalized.

Each kit comprises:

- Large, robust, watertight, bright yellow, lockable carry case in which all components are mounted. Each case is numbered and has a return address on it in case it is lost.
- Each case is lined with cushioning dense rubber foam in which mounting slots have been cut for all components.
- Vaisala PTB220A Class A, triple cell barometer complete with display showing individual readouts of the three cells and an average of all of them. A power supply which is switched when the watertight mounting case (same material as the main case) is opened. Barometer damping device. The barometer is mounted in the same foam as for the other components.
- Greisinger GTH 175/PT inspector's temperature probe and display.
- Combined compass and clinometer
- Spirit level

- Tape measure
- Two disposable cameras
- A set of calipers for rain gauge diameter checks
- A metal rod for Campbell-Stokes sunshine recorder adjustment
- An aluminium machined metal plate for positioning over the sunshine recorder to allow it to be leveled.
- Tool set
- Manual of instructions adapted from MetService's own Inspector's Manuals (this is currently being written).
- Station record sheets.
- Internally mounted carry folder for all documentation.
- Two combination padlocks to enable the case to be secured when traveling.

The kits have been designed and constructed by MetService's calibration engineers and are intended to provide capability to inspect all manual climate stations, as far as practicable in the field.

All instruments in the inspector's kits have been calibrated against MetService's laboratory standards which in turn are maintained to the National Standard and so to the International Standards.

When each kit is returned to MetService from a country, it will be checked for damage and content. If TSP funding permits it is intended that we will repair the kit but will seek approvals as necessary before doing so. The instruments will be calibrated on their return, cameras replaced and the kit despatched to the next country. Station meta-data will be extracted from the inspections, film developed and printed and the raw data provided back to each country with copies retained by the TSP.

The cost of freighting the kits to and from MetService has been budgeted, as has an allowance for internal country travel for inspections.

Each kit is quality controlled by the Calibration Laboratory to MetService ISO9001 Quality Assurance standards and appropriate records of instrument calibration and kit movement are maintained.

Photos showing an inspector's kit are included as an Appendix to this report.

4.7 GSN Stations Training Course

To accommodate an increase in resource in the GUAN Fault Maintenance component, as was requested by WMO, and the budget changes, the GSN Stations Training Course was suspended from the programme funds. The TSP Agreement refers to completing this activity provided the additional unscheduled maintenance

trips were not required. This TSP year we have extra engineering trips to the GUAN stations that the TSP supports for the installation of Proton generators and for station refurbishment projects. As reported, we have already covered the disbursements for one fault trip to Tarawa from another project. Further, the cause of most faults at all three stations has been the aging hydrogen plants; two have been replaced with Proton Hogen systems and the third is pending. For these reasons we are confident that for this TSP year the extra trips allowed for are unlikely to all be required.

The training course was originally costed on the basis that representatives from all GSN countries that are supported by the TSP would spend time at Wellington attending a training course on completing station inspections and using the inspector's kits, the use of climate data software and maintaining station meta-data.

The Climate Data Management workshop that is being hosted by the Bureau of Meteorology at Melbourne from 29 November to 2 December will cover the climate data software through a number of software presentations. Garry Clarke, International Operations Manager, has been assisting the GCOS Secretariat in evaluating and using the CliRep software and has been invited to present and train in that system at the Workshop. The Bureau has kindly agreed to allow us to use their facilities on Friday 3 December for the other TSP planned training. WMO has also kindly agreed to meet the per diems for the extra day for all participants from WMO member countries. For Tuvalu and Tokelau, which are not WMO member countries, the TSP will pay for all travel costs associated with attendance at both the Data Management workshop and the training course. This collaboration will achieve efficiencies and is beneficial to all parties. It allows this component of the TSP to be completed at a lower cost than previously contemplated.

4.8 GSN Stations Inspection costs

We are planning to commence with countries that have stations not requiring a lot of in-country boat travel. This will enable more stations to be completed sooner. The quarterly budgeted amounts for this component are likely to vary depending on the number of countries that are completed and when costs are applied.

4.9 Reserves

There have been no requirements to date and none have been budgeted. However, we note the negative effect of the New Zealand Dollar appreciating against the United States Dollar on the actual funds available for the work programme.

4.10 Programme management and administration

An existing basic system for monitoring the receipt of upper air data received from Tarawa, Funafuti and Penrhyn GUAN stations has been formalized and enhanced. Wherever possible we pursue the reasons for the non-receipt of upper air data. The

receipt of the data at our email gateway is also monitored remotely at weekends by Garry Clarke for time of receipt and indications of communications issues. Every 24 hours a new log file for inwards messages is created and while the data is archived, the receipt details are over-written.

We are pleased to report that the Permanent Representatives or Directors from all nations that are provided for under the TSP have accepted assistance. Many positive responses were received to our letter explaining the support that was being offered by the GCOS Secretariat through the TSP project. Some countries noted that they simply could not afford to provide for the inspections that were needed for their GSN stations and particularly welcomed assistance. The countries provided for by the TSP are:

Station Nr.	Station	Country	GSN	GUAN
91490	Christmas Is (Kiritimati)	Kiribati		
91610	Tarawa	Kiribati		
91701	Kanton	Kiribati		
91503	Munda	Solomon Islands		
91517	Honiara	Solomon Islands		
91554	Tekoa Airport, Santo	Vanuatu		
91568	Aneityum	Vanuatu		
91631	Nanumea	Tuvalu		
91643	Funafuti	Tuvalu		
91650	Rotuma	Fiji		
91652	Udu Point AWS	Fiji		
91680	Nadi	Fiji		
91699	Oni I Lau AWS	Fiji		
91724	Nukunonu	Tokelau Islands		
91780	Lupepau'u	Tonga		
91789	Nuku'alofa	Tonga		
91801	Penrhyn	Cook Islands		
91802	Penrhyn AWS	Cook Islands		
91812	Pukapuka AWS	Cook Islands		
91831	Aitutaki AWS	Cook Islands		
91824	Rarotonga	Cook Islands		
91824	Hanan Airport	Niue		
92014	Madang	Papua New Guinea		
92035	Port Moresby	Papua New Guinea		
92044	Momote	Papua New Guinea		
91960	Pitcairn Is	United Kingdom Territory		

Pitcairn Island has a dual-satellite, MetService AWS that is maintained by MetService on behalf of the United Kingdom. This GSN station does not require assistance under the TSP.

Garry Clarke provided extensive testing and evaluation of software supplied by the GCOS Secretariat for the management of climate data and the preparation of CLIMAT and CLIMAT TEMP messages. Some errors and improvements were advised to the developer.

As reported previously, CLIMAT TEMP messages were re-established for Tarawa and Funafuti GUAN stations and Penrhyn will start with the introduction of radiosonde on 1 November.

The Penrhyn technician visited during the quarter and some Proton and Digicora training was provided.

Routine programme control of activities, coordination, financial planning, management and administration was undertaken during the quarter.

MetService's engineering staff was increased by two. One position was partly justified by the TSP project. The total maintenance engineering staff is twelve of which two are calibration laboratory engineers. This allows for some degree of specialization in equipment and the ability to respond to simultaneous problems.

5 Project Activity Planned for Next Quarter

- Establish and consolidate radiosonde at Penrhyn.
- Purchase the Digicora regional spares kit and thyratrons for Penrhyn.
- Provide training and facilitate Tokelau and Tuvalu attendance at Climate Data Management workshop, Melbourne.
- Complete inspection kits and dispatch the first ones after the training.
- Plan and commence the establishment of a meta-data reporting system.

6 Report Distribution

- Mr Henry Taiki
WMO Programme Officer
WMO Sub-regional Office for the South West Pacific
- Mr Richard K. Thigpen
GCOS Implementation Manager
WMO
- Mr Howard J. Diamond
U.S. GCOS Program Manager
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7 Report Preparation

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Appendix One

Generic Letter to GUAN/GSN countries offering TSP assistance. A similar letter adapted for GSN only was sent to GSN countries.

NPRO/60

16 June 2004

Dear

TECHNICAL SUPPORT PROJECT

I am pleased to advise that we are able to offer assistance, if you wish, to review and help (country) improve the data being provided to global climate centres from its GSN stations. Extra support will be provided for the upper air programme at (country) in improved monitoring of performance and technical assistance. We will let you know details of that as we develop the project.

MetService has been contracted by WMO / GCOS Secretariat to offer specified assistance to Pacific GUAN and GSN stations. While most of the assistance is presently targeted at some GUAN stations there is a component for GSN. This is mostly determining the present exposure and calibration of instruments being used, but also includes some provision for bringing past records up-to-date including stations' metadata (past and present information about the station and its equipment). We are also hoping to have enough funds to provide a short inspectors' training course in New Zealand for those countries who feel they would benefit from it.

We are intending to construct three inspection kits and loan them to countries on a rotation basis for their staff to complete local inspections. Where local travel is required we plan to assist with those costs. The kits would be calibrated against the standards we use in New Zealand, which are traceable to international standards, both before the loan of the kit and after its return to our Paraparaumu calibration laboratory.

I must stress that it is not our wish to take over providing this information to the climate centres but rather to help countries bring records up to date and to prepare some of the required information for countries themselves to submit. Any forms and systems we set up to achieve this would be provided to countries so that they can manage their own

requirements in the future. We already hold metadata information in archived files for stations that New Zealand has previously assisted for the periods prior to about 1990.

We understand that the GSN stations at (country) are:

91xxxx

At this stage we are planning and prioritising the work so if you would like to accept our offer for the GSN assistance then I would be grateful if you would let me know (email will be fine).

Please note that the only cost to (country) would be your own staff time to extract and send us information, undertake a station inspection and possibly attend a training course. There would be no external costs.

I look forward to hearing from you.

Kind regards

Tony Veitch
Manager International Development and Services
Email: veitch@metSERVICE.com

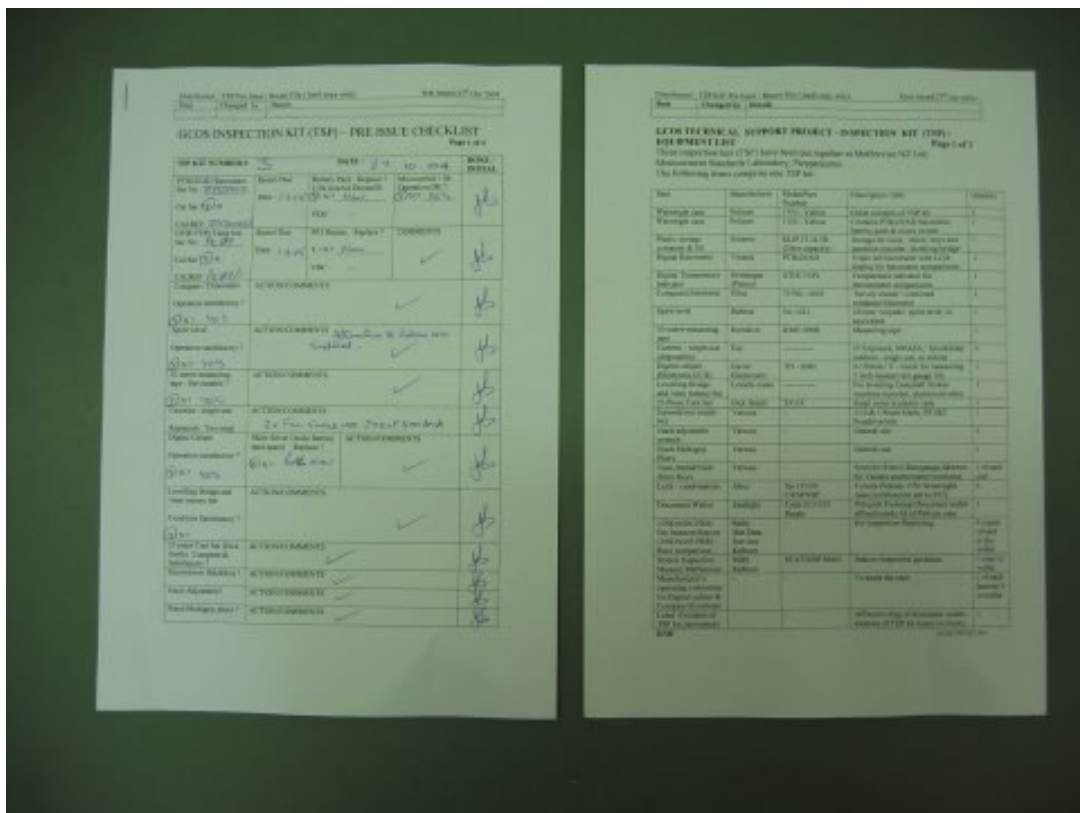
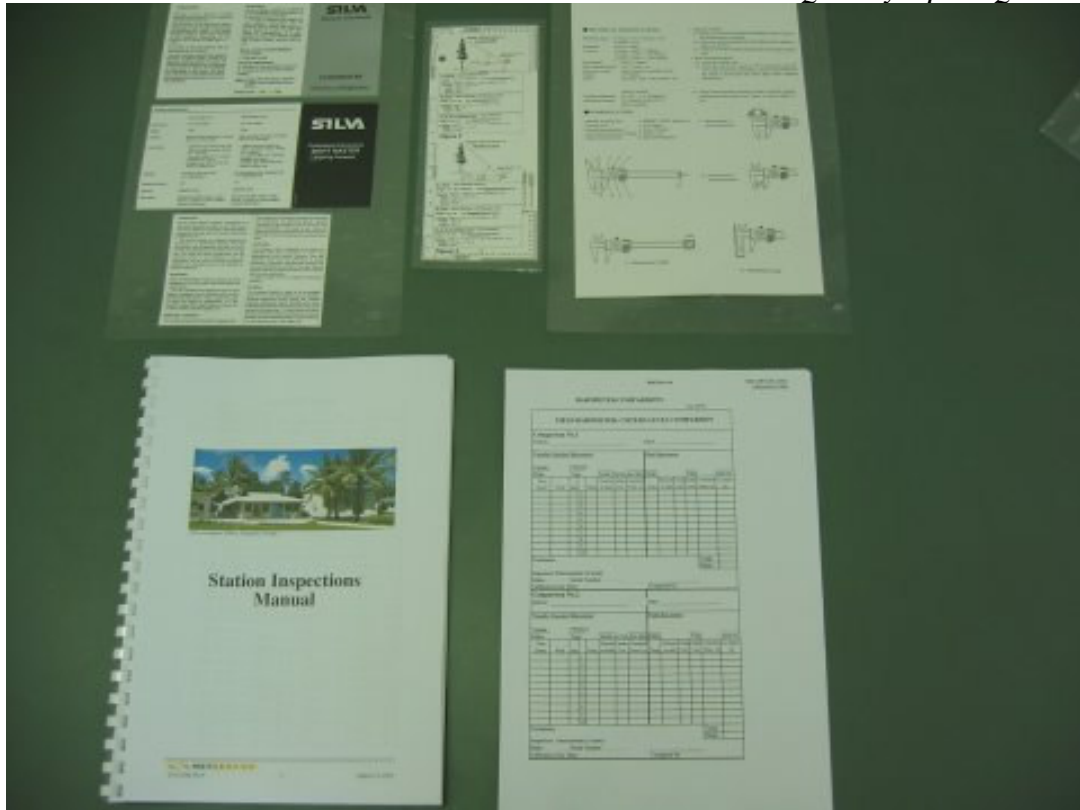
Appendix Two

Inspector's Kit Photos









Appendix Three

Calibration standards and certifications

Overview

MetService operates all of its services under an externally audited ISO 9001 Quality Assurance programme. Customers that are required to operate plant and equipment to identifiable, traceable standards can benefit from MetService's procedures. The following calibration standards, certifications and equipment apply to the sensors that MetService, itself, would calibrate under this proposal. References within this section to numbered "Procedures" relate to MetService's ISO 9001 Quality Assurance procedures from where this information is derived. Further information can be provided if required.

8.1 *Atmospheric pressure calibration equipment & standards*

8.1.1 Primary Standard

Vaisala PTB220A triple cell barometer, Serial number V4040004.

The Vaisala barometer has been calibrated and certified by the National Standards Laboratory of New Zealand.

New Zealand Physics and Engineering Laboratory, DSIR, (now known as Measurement Standards Laboratory of New Zealand, Industrial Research Ltd.), Report No. Pressure/2002/262, Dated 13 February 2002.

8.1.2 Working Standard

Ruska Instrument Corp. digital pressure gauge, with integral pressure controller, Model 6010-161-1100MB ABS; and associated interface panel Model 6005-761:calibrate/recertificate against MetService Primary Standard at intervals not exceeding two years.

8.2 *Temperature calibration equipment & standards*

8.2.1 Working standard

Two x platinum resistance thermometers: Leeds & Northrup model 8926 calibrated against National Standard by Industrial Research Ltd at two-yearly intervals.

8.2.2 Tinsley 100W Type 5685A standard resistor

Calibrated by Industrial Research Ltd as per Procedure 11NSS985 at two-yearly intervals.

8.2.3 Datron type 1061A Multimeter

Calibrated by either Industrial Research Ltd or the UK NAMAS accredited laboratory of Wavetek Ltd - Datron Division as per Procedure 11NSS971 at two-yearly intervals. Before each temperature calibration batch run, calibrate against the Tinsley 100WType 5685A standard resistor.

8.2.4 Decade resistance boxes

Calibrated against Datron 1061A Multimeter before use as per Procedure 11NSS970. YSI 4320A thermilinear indicator: calibrate against Datron 1061A Multimeter at intervals not exceeding 12 months as per Procedure 11NSS962.

8.2.5 Hewlett Packard HP 34401A Multimeter

Calibrated annually by Hewlett Packard (NZ) Ltd as per Procedure 11NSS958.